

Chemistry	Group-II	Paper-I
Time: 1.45 Hours	(Subjective Type)	Marks: 48

(Part-I)

Q.2. Write short answers to any Five (5) questions: 10

(i) Define organic chemistry.

Ans Organic chemistry is the study of covalent compounds of carbon and hydrogen (hydrocarbons) and their derivatives.

(ii) Write down the name of any two elements which were discovered in early ages.

Ans The elements which were discovered in early ages are as follows:

1. Carbon

2. Gold

(iii) What is homoatomic molecule? Give an example.

Ans A molecule containing same type of atoms is called homoatomic molecule. For example: hydrogen (H_2), ozone (O_3), sulphur (S_8) and phosphorus (P_4).

(iv) What are canal rays?

Ans In 1886, Goldstein observed that in addition to cathode rays, other rays were also present in the discharge tube. These rays were traveling in opposite direction to cathode rays. He used a discharge tube having perforated cathode. He found that these rays passed through holes present in the cathode and produced a glow on the walls of the discharge tube. He called these rays as "canal rays".

(v) What is meant by quantum and quanta?

Ans Quantum means fixed energy. It is the smallest amount of energy that can be emitted or absorbed as electromagnetic radiation.

Quanta is plural of quantum.

(vi) How did Newlands arrange the elements?

Ans In 1864, British chemist Newlands put forward his observations in the form of 'law of octaves'. He noted that there was a repetition in chemical properties of every eighth element if they were arranged by their increasing atomic masses.

(vii) Write down the name of the elements of first period.

Ans First period consists of only two elements e.g., Hydrogen (H) and Helium (He).

(viii) What is electron affinity? Give an example.

Ans Electron Affinity is defined as "The amount of energy released when an electron is added up in the outermost shell of an isolated gaseous atom."



Affinity means attraction. Therefore, electron affinity means tendency of an atom to accept an electron to form an anion. For example, the electron affinity of fluorine is -328 kJ mol^{-1} i.e., one mole atom of fluorine release 328 kJ of energy to form one mole of fluoride ions.

Q.3. Write short answers to any FIVE (5) questions: 10

(i) Why a covalent bond becomes polar?

Ans When two atoms approach each other, attractive forces develop between electrons of one atom and nucleus of other atom. Simultaneously, repulsive forces between electrons of the two atoms as well as between their nuclei are also created. When the attractive forces dominate due to decrease in distance between those two atoms, a chemical bond is formed between them.

(ii) Describe at least two necessary conditions for the formation of covalent bond.

Ans The conditions required for the formation of covalent bond are as follows:

1. Electronegativity of elements must be high.
2. The ionization energy of electrons must be high.

(iii) Differentiate between lone pair and bond pair of electron.

Ans Differences between Lone pair and Bond pair e⁻s

Lone pair electrons	Bond pair electrons
The non-bonded electron pair available on an atom, like the one available on nitrogen in ammonia, ($\ddot{\text{N}}\text{H}_3$) is called a lone pair.	The electrons that pair up to form a chemical bond are called 'bond pair' electrons.

(iv) What do you mean by volume / volume % ? Also give one example.

Ans Percentage - volume / volume (% v/v):

It is the volume in cm^3 of a solute dissolved per 100 cm^3 of the solution. For example, 30 percent alcohol solution means 30 cm^3 of alcohol dissolved in sufficient amount of water, so that the total volume of the solution becomes 100 cm^3 .

$$\% \text{ by volume} = \frac{\text{Volume of solute (cm}^3\text{)}}{\text{Volume of solution (cm}^3\text{)}} \times 100$$

(v) Define the term allotropy with examples.

Ans The existence of an element in more than one forms in same physical state is called allotropy. Allotropy is due to:

The existence of two or more kinds of molecules of an element each having different number of atoms such as allotropes of oxygen are oxygen (O_2) and ozone (O_3).

(vi) Define suspension with an example.

Ans Suspension is a heterogeneous mixture of undissolved particles in a given medium. Particles are big enough to be seen with naked eyes. Examples are chalk in water (milky suspension), paints and milk of magnesia (suspension of magnesium oxide in water).

(vii) Why water is called a universal solvent?

Ans Water is called the universal solvent because it dissolves more substances than any other solvent, due to its polar nature.

Our body is made up of tissues, which are all composed of water-based chemicals. The water becomes the best solvent in our body as well.

(viii) Define true solution with an example.

Ans These solutions are the homogeneous mixtures of two or more than two components. Each component is mixed in such a way that their individual identity is not visible. The simplest example is that of a drop of ink mixed in water.

Q.4. Write short answers to any FIVE (5) questions: 10

(i) What is meant by strong electrolytes? Give one example.

Ans The electrolytes which ionize almost completely in their aqueous solutions and produce more ions, are called strong electrolytes. Example of strong electrolytes are aqueous solutions of NaCl, NaOH and H_2SO_4 etc.



(ii) Why is galvanizing done?

Ans The process of coating a thin layer of zinc on iron is called galvanizing. This process is carried out by dipping a clean iron sheet in a zinc chloride bath and then heating it. After this, iron sheet is removed, rolled into molten zinc metal bath and finally air-cooled. Advantage of galvanizing is that zinc protects the iron against corrosion even after the coating surface is broken.

(iii) What is difference between valency and oxidation state?

Ans Differences between Valency and Oxidation state

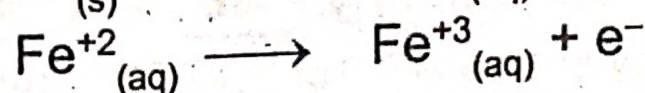
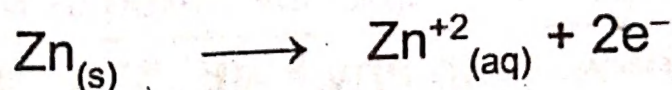
Valency	Oxidation
1. The apparent charge on an atom, ion or molecule is called valency. It is combining capacity of an element with other elements.	1. The apparent charge assigned to an atom of an element in a molecule or in an ion.

2. Valency is written as the sign followed by the number *i.e.*, 2+.

2. While assigning oxidation numbers, the sign precedes the number. It is written as +2.

(iv) Define oxidation in term of electrons? Give an example.

Ans Oxidation is the loss of electrons by an atom or an ion. *e.g.*,



(v) Give any two uses of sodium.

Ans Following are the two uses of sodium:

1. It is used to produce yellow light in sodium vapour lamps.
2. It is used as a reducing agent in the extraction of metals like Ti.

(vi) Define Redox reaction.

Ans Chemical reactions in which the oxidation state of one or more substances changes are called oxidation-reduction or redox reactions.

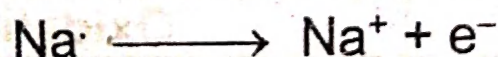
(vii) What is meant by electropositive character? Give one example.

Ans Electropositivity:

The tendency of an atom to lose its valence electrons is called electropositivity or metallic character.

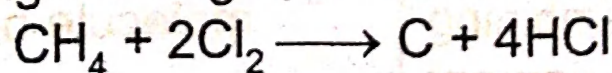
For example:

Sodium being electropositive element, has the tendency to lose electrons.



(viii) Write the chemical reaction of methane with chlorine. Give its chemical equation.

Ans In bright sunlight, the reaction is violent.



In the presence of diffused sunlight, the reaction of chlorine with methane is slow and gives series of compounds i.e., CH_3Cl , CH_2Cl_2 , CHCl_3 and CCl_4 .

(Part-II)

NOTE: Attempt any TWO (2) questions.

Q.5.(a) How neutron was discovered? Write its properties. (5)

Ans Rutherford observed that atomic mass of the element could not be explained on the basis of the masses of electron and proton only. He predicted in 1920 that some neutral particle having mass equal to that of proton must be present in an atom. Thus scientists were in search of such a neutral particle. Eventually, in 1932, Chadwick discovered neutron, when he bombarded alpha particles on a beryllium target. He observed that highly penetrating radiations were produced. These radiations were called neutron.



Properties of neutron are as following:

- (i) Neutrons carry no charge i.e., they are neutral.
- (ii) They are highly penetrating.
- (iii) Mass of these particles was nearly equal to the mass of a proton.

(b) Give any four differences in compound and mixture. (4)

Ans Differences between compound and mixture:

Compound	Mixture
(i) It is formed by a chemical combination of atoms of elements.	Mixture is formed by the simple mixing up of the substances.
(ii) The constituents lose their identity and form a new substance	Mixture shows the properties of the constituents.

having entirely different properties from them.	
(iii) Compounds always have fixed composition by mass.	The minimum number and ratio of the components may not be fixed.
(iv) The components, cannot be separated by physical means.	The components, can be separated by simple physical methods.

(Q.6.(a) Write down any five properties of metals. (5)

Ans For Answer see Paper 2017 (Group-I), Q.6.(a).

(b) Define evaporation and it depends on which factors? (4)

Ans For Answer see Paper 2016 (Group-I), Q.6.(b).

Q.7.(a) Define corrosion and rusting. Describe any three methods for prevention of corrosion. (5)

Ans **Corrosion:**

"Corrosion is slow and continuous eating away of a metal by the surrounding medium."

It is a redox chemical reaction that takes place by the action of air and moisture with the metals. The most common example of corrosion is rusting of iron.

Rusting:

"Corrosion is a general term but corrosion of iron is called rusting."

The important condition for rusting is moist air (air having water vapours in it). There will be no rusting in water vapours free of air or air free of water.

Prevention of Corrosion:

Removal of stains:

The regions of stains in an iron rod act as the site for corrosion. If the surface of iron is properly cleaned and stains are removed, it would prevent corrosion.

Paints and greasing:

Greasing or painting of the surface can prevent the corrosion of iron. With development of technologies, modern paints contain a combination of chemicals called stabilizers that provide protection against the corrosion in addition to prevention against the weathering and other atmospheric effects.

Alloying:

Alloy is a homogenous mixture of one metal with one or more other metals or non-metals. Alloying of iron with other metals has proved to be very successful technique against rusting. The best example of alloying is the 'stainless steel', which is a good combination of iron, chromium and nickel.

(b) Write down the four characteristics of colloid. (4)

Ans ➤ For Answer see Paper 2018 (Group-I), Q.7.(b).

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